Abstract Submitted
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Normal force and interpenetration between polyelectrolyte brushes[1] MARK MATSEN, University of Reading — We examine the normal force between two opposing polyelectrolyte brushes and the interpenetration of their chains that is responsible for sliding friction. We focus on the special case of semi-dilute brushes in a theta solvent, for which the classical strong-stretching theory (SST) can be solved analytically. Interestingly, SST predicts that the brushes contract as they are compressed together maintaining a polymer-free gap, which provides an explanation for the ultra-low frictional forces observed in experiment. We examine the degree to which the SST predictions are affected by chain fluctuations by employing self-consistent field theory (SCFT). While the normal force is relatively unaffected, fluctuations are found to have a strong impact on brush interpenetration. Even still, the contraction of the brushes does significantly prolong the onset of interpenetration, implying that a sizeable normal force can be achieved before the sliding friction becomes significant.

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